

Novel Modular Double-Acting Free-Piston Stirling Convertor, Phase II

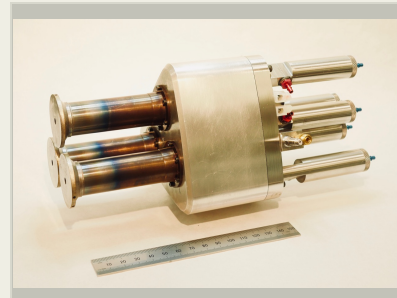
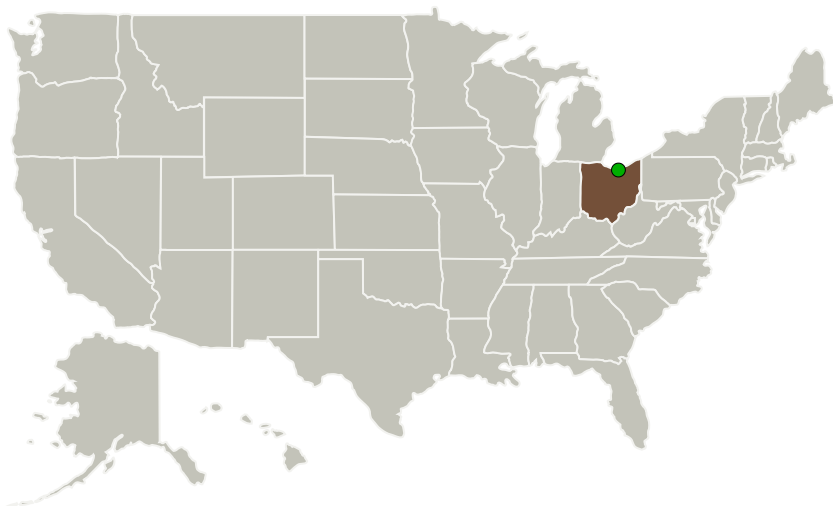


Completed Technology Project (2016 - 2019)

Project Introduction

We will build and test a stirling-cycle convertor for generating electrical power from the heat output of a radioisotope heat source (GPHS), addressing evolving NASA requirements for highly reliable, robust, and easily adaptable configurations for space-power applications. Our double-acting stirling cycle configuration combines a linear alternator with a moving piston/regenerator assembly into a self-contained module. A number of such modules can be connected together into several possible convertor layouts to scale power, achieve system redundancy and cancel vibration forces. This modular approach provides the system designer with unique packaging options not available with conventional stirling convertors. Our primary Phase II focus will be to build and test this core module within a simple three-module convertor configuration. The part count per module is low and the design is amenable to mass production manufacturing methods. An intrinsic feature within the thermodynamic circuit prevents catastrophic piston over-stroke in the event the electrical load is interrupted. A potentially transformational passive reciprocating hydrodynamic gas bearing suspends the moving piston within its cylinder, eliminating wear and providing a highly effective piston seal. An optional hydrodynamic spin bearing system is available as a backup.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Converter Source, LLC	Lead Organization	Industry	Athens, Ohio
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Ohio

Project Transitions

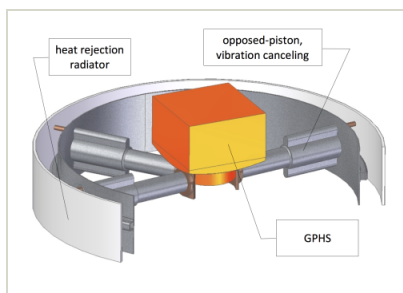
▶ **April 2016:** Project Start

✓ **February 2019:** Closed out

Closeout Documentation:

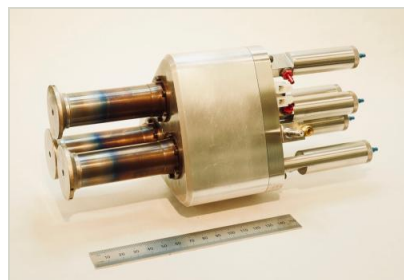
- Final Summary Chart(<https://techport.nasa.gov/file/139843>)

Images



Briefing Chart Image

Novel Modular Double-Acting Free-Piston Stirling Convertor, Phase II (<https://techport.nasa.gov/image/131499>)



Final Summary Chart Image

Novel Modular Double-Acting Free-Piston Stirling Convertor, Phase II (<https://techport.nasa.gov/image/135793>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Converter Source, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

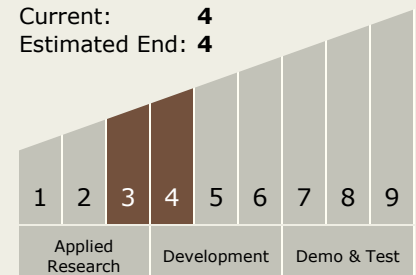
Carlos Torrez

Principal Investigator:

David R Gedeon

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.2 Heat Sources

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System